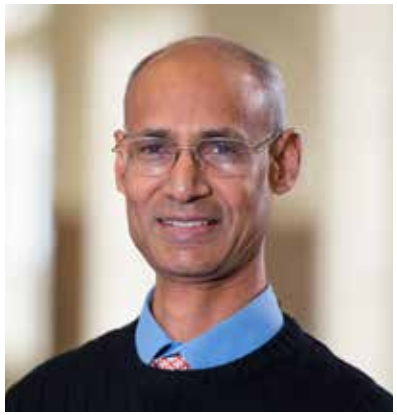
Nebraska Water Center
1964-2014

Annual Report 2013-2014

Water for Food
ROBERT B. DAUGHERTY INSTITUTE
NEBRASKA WATER CENTER
at the University of Nebraska

Letter from the Director



I am pleased to present this annual report on the activities, finances and many accomplishments of the Nebraska Water Center (NWC) during 2013 and 2014, a time when the NWC is celebrating its Golden Anniversary.

More than being a simple look back at where we've been and what we have accomplished over the past year, this report looks forward to the complex challenges and exciting opportunities that lie ahead of us.

We are now an integral part of the Robert B. Daugherty Water for Food Institute (DWFI), a growing global institute focused on one of the 21st Century's most urgent challenges: achieving global food security with less pressure on water resources through improved management of water in agricultural and food systems. DWFI is committed to ensuring a water and food secure world without compromising the use of water for other human and environmental needs. The NWC fits well within that noble goal. For 50 years we have focused on helping build the University of Nebraska's reputation as one of the nation's leading academic institutions in the areas of agricultural and domestic water use. We have achieved this by fostering and investing in water research, teaching, extension and outreach.

We are equally proud of the growing research and teaching roles of our associated Water Sciences Laboratory in advancing the work and achievements of the NWC and the University of Nebraska. The lab, under the direction of Dr. Daniel Snow, will celebrate its 25th anniversary next year.

Chittaranjan Ray

Chittaranjan Ray, Ph.D., P.E.
Director
Nebraska Water Center
University of Nebraska

The Nebraska Water Center, Since 1964

The Nebraska Water Resources Research Institute, now the Nebraska Water Center or NWC, was established by Congressional mandate as one of 54 state and territorial Water Resources Research Institutes in 1964.

Its research and programs support and promote the University of Nebraska as an international leader in water research, teaching, extension and outreach.

After 50 years, the NWC's role is more important than ever in its history.

NWC coordinates a wide range of research impacting water issues, facilitating a deeper understanding of water and its many beneficial uses; helps develop new water researchers; trains future water researchers and engineers; and disseminates water research results to water professionals and the public through publications, research colloquiums and conferences, electronic media, lectures and tours.

The NWC is committed to:

- Sharing the latest research findings with water managers and the public through conferences and workshops, print, electronic and online mediums, interactions with the media and one-on-one contact with stakeholders.
- Supporting research and extension education by connecting faculty to external collaborators and stakeholders, fostering interdisciplinary teams, alerting faculty to funding opportunities and providing grants and sharing grant information.
- Aiding new scientists through mentoring, seed grants and helping them build their research programs.
- Helping train future water managers, water and environmental professionals and scientists by helping with student recruitment and reshaping academic programs to meet the needs and challenges of the future.

In 2012, NWC became part of the Robert B. Daugherty Water for Food Institute at the University of Nebraska (changing names from the UNL Water Center to the Nebraska Water Center).

Nebraska Water Center Advisory Board

The NWC advisory board provides perspective and guidance to the organization, supporting the NWC's mission to advance water-related research, education and outreach, and sharing information with constituent groups.

The advisory board reviews and discusses research needs, particularly in Nebraska; events and programs for facilitating interdisciplinary research; shaping of academic programs; seed grant awards; and outreach event topics.

The NWC seeks a diversity of interests, ideas and points of view among the advisory board membership.

Current Advisory board members are:

Shannon Bartelt-Hunt
Department of Civil Engineering, UNL

John Bender
Nebraska Department of Environmental Quality

Jesse Bradley
Nebraska Department of Natural Resources

Dana Divine
Conservation & Survey Division, School of Natural Resources, UNL

Dean Eisenhauer
Department of Biological Systems Engineering, UNL

Valery Forbes
School of Biological Sciences, UNL

Rick Holland
Nebraska Game and Parks Commission

Alan Kolok
Nebraska Watershed Network, UNO and UNMC

John Miyoshi
Lower Platte North NRD

Chittaranjan Ray
Nebraska Water Center, NU

Tim Shaver
Department of Agronomy and Horticulture, West Central Research & Extension Center, UNL

Steve Thomas
School of Natural Resources, UNL

Ron Zelt
U.S. Geological Survey, Nebraska Water Science Center

The Water Resources Advisory Panel: A Key to Success

Recognizing the critical importance of water to the environmental and economic well-being of our state, the University of Nebraska (NU) has had an ongoing commitment to excellence in water resources research, education and outreach for decades. In 2006 Nebraska was facing serious water issues as a result of interstate compacts and agreements, state statutes, continuing drought and other factors. To address these concerns, the NWC developed the Water Resources Advisory Panel (WRAP) to better connect the University with the wisdom of outside experts and those who often rely on NU water-related research, education and outreach to make decisions impacting Nebraska's water resources.

Members represent a cross section of the Nebraska water decision-making community, providing guidance to NU on state water research needs, education, and outreach programs. The WRAP is convened by Ronnie Green, vice president of the University of Nebraska and IANR Harlan Vice Chancellor, and Prem Paul, vice chancellor for Research and Economic Development. The WRAP generally meets three times a year – in January, April, and September.

Current WRAP members are:

Frank Albrecht
Nebraska Game and Parks Commission

Brian Barels
Nebraska Public Power District

Mark Brohman
Nebraska Environmental Trust

Tom Carlson
Natural Resources Committee Chair, Nebraska Legislature

Eugene Glock
Cedar Bell Farms

Jerry Kenny
Platte River Recovery and Implementation Program

Marian Langan
Audubon Nebraska

Jerry Obrist (retired)
City of Lincoln Water System

Lee Orton
Nebraska Well Drillers Association

Jay Rempe
Nebraska Farm Bureau Federation

Pat Rice
Nebraska Department of Environmental Quality

Ken Schilz
Agriculture Committee Chair, Nebraska Legislature

Jim Schneider
Acting Director, Nebraska Department of Natural Resources

Lyndon Vogt
Central Platte Natural Resources District

Dayle Williamson (retired)
Office of Senator Ben Nelson, retired

Also working closely with WRAP are Ron Yoder, associate vice chancellor, IANR; Monica Norby, assistant vice chancellor, UNL Office of Research; and, Chittaranjan Ray, director of the NWC.

Rachael Herpel, research and outreach coordinator for the DWFI, serves as the liaison and coordinator for panel activities and for water faculty activities associated with WRAP.

Water Research

Primary Goals:

The NWC's primary goal is to help position NU as a state and national leader in teaching, research and extension education in water sciences, water management and water law and policy, and to serve Nebraska and all Nebraskans in these critical areas.

Specifically, to:

Develop, facilitate, and implement research, teaching, and outreach programs in water sciences.

Expand the financial resource base for NU water programs from private, non-governmental and governmental sources.

Establish and maintain collaborative links with state and federal agencies, industry, producers and other water resource entities.

Research Areas:

- Impacts of climate and weather on water resources.
- Understanding and protecting water quality.
- Groundwater-surface water interactions.
- Improving water efficiency in crop production.
- Drinking water and wastewater quality and management.
- Ecosystems, ecology and adaptive management.
- Economic impacts of water management decisions.
- Human dimensions of water use.

Examples of Water Research:

- Monitoring underground wireless sensor networks to measure soil moisture and increase irrigation efficiency.
- Implementing simple and inexpensive processes to treat groundwater contaminated with trichloroethelene (TCE), a common and toxic groundwater contaminant.
- Mitigating the effects of and reducing use of pesticides, pharmaceuticals and livestock supplements to improve surface and groundwater quality.
- Investigating the degree of connection between the Platte River and nearby groundwater.
- Designing new research methods in remote sensing to detect and monitor ground water quality, including toxic algal blooms.
- Investigating the occurrence, distribution, vulnerability, and mitigation of small community water supplies related to groundwater uranium and arsenic.
- Improving water management through quantification of evapotranspiration.
- Instigating irrigation efficiency studies, such as subsurface-drip irrigation and the use of decision-support tools.
- Providing regional leadership in global climate change research related to water.

New Management Arsenal:

To combat the worst drought in more than half a century, U.S. farmers are drawing on their best defenses — the center pivot and their own vast experience in dealing with Mother Nature's rath. Now NU is giving them a new tool for their irrigation management arsenal — one with the potential to decrease costs, conserve water, and improve yields. Mehmet Can Vuran, assistant professor of Computer Science and Engineering, has developed wireless underground sensor networks that offer agricultural producers real-time information about soil moisture and changing conditions, which allow them to more efficiently manage irrigation.

Making Every Drop Count:

Agricultural water use is a high-stakes numbers game and UNL Extension services are helping Nebraska's agricultural producers beat the odds. In Nebraska, as well as around the world, farmers are challenged with conservation and using water resources more efficiently, while meeting crop water requirements to maintain high yields. To help farmers with irrigation management, the UNL Extension, the Upper Big Blue Natural Resources District, growers in south central Nebraska and the Natural Resources Conservation Service cooperatively developed the Nebraska Agricultural Water Management Network (NAWMN), under the leadership and direction of Suat Irmak, Harold W. Eberhard Distinguished

Professor of Biological Systems Engineering at UNL. It has grown to a network of more than 800 producers throughout Nebraska, all using cutting-edge technology to determine when and how much to irrigate, so they can make every drop count.

Water Optimizer:

With outlooks for drought and limited irrigation continuing through much of Nebraska, what can producers do? There are a number of tools available for producers and urban homeowners to help manage water resources. One is the Water Optimizer, a Microsoft Excel-based program that can estimate a profit-maximizing cropping mix based on a limited amount of water. The tool has several options allowing users to customize the model to reflect their farm.

Mobilization of Groundwater in Uranium:

Over the next three years, UNL researchers will use a U.S. Geological Survey (USGS) regional competitive grant to study what effect groundwater nitrate contamination may have on stimulating the movement of naturally occurring uranium deposits. Biogeochemist Karrie Weber, a researcher in UNL's School of Biological Sciences and Department of Earth and Atmospheric Sciences; Dan Snow, hydrogeochemist and director of the NWC's Water Sciences Laboratory; and Kate Campbell, biogeochemist and scientist with the USGS in Boulder, Colorado, will team on the research, which the USGS recently awarded a nearly $231,000 grant. Non-federal matching funds will bring the three-year project total to $467,500. The researchers will focus on how groundwater nitrate contamination may influence the mobility of naturally occurring uranium in aquifers ultimately used to supply public and private drinking water throughout the U.S.

Partnership Working to Clean Contaminated Groundwater:

Earlier this year, Steve Comfort, a soil and water chemist with UNL's School of Natural Resources, teamed with UNL graduate and undergraduate students and a local company run by one of his former students to install a new version of an oxidant candle that holds promise as solution for detoxifying soil. The candle they designed contains permanganate, a chemical compound that mixes with and oxidizes toxic chemicals, like vinyl chloride (VC), trichloroethylene (TCE) and perchloroethylene (PCE), turning them into harmless carbon dioxide and chloride. Permanganate's usefulness in restoring contaminated water and wastewater is well known; the innovation is finding simple and inexpensive ways to use it, which can help communities looking for affordable pollution solutions.

Information For Our Clients and the Public

The NWC pursued a active and diverse information transfer program in 2013 and 2014. USGS funding helps underwrite a variety of public and professional events, public relations and educational efforts, including:

1. Water Current quarterly newsletter
2. NWC fact sheets and an online UNL water faculty directories database
3. More than 20 press releases reporting on water-related research and outreach programming with ties to the NWC and the University of Nebraska
4. Support for both Nebraska Water Center and Nebraska Water Sciences Laboratory websites
5. Publicity and supporting materials for an annual water and water law conference, public lecture series, water symposium, brown bag lectures, and water and natural resources tour
6. Coordination of Husker Harvest Days, one of UNL Extension's largest public display and student recruitment events of the year

The Water Current newsletter has a free, subscriber-based distribution of approximately 2,800 copies per issue. Published quarterly, the full-color magazine is also available online as a PDF. The newsletter highlights professional faculty and staff, articles on research and educational programming, upcoming events and other useful information.

The NWC has a long-standing reputation as a reliable source for water and natural resources news among the media.

The NWC produces press releases and works closely with local, state and national media. The releases support and cross many departmental and academic lines within the NU system, and the NWC writes them for many faculty members who do not have communications or public relations support readily available.

Brochures, pamphlets and fact sheets:

Promotional print materials are produced on an as-needed basis. These materials include, but are not limited to: NWC mission and programming, UNL Water Sciences Laboratory, annual Water and Natural Resources Tour and other units and programs affiliated with or sponsored by the NWC. All have electronic versions, as well.

Water and Natural Resources Seminars:

Each spring, the NWC organizes a series of 12 to 14 free public lectures. Established in the early 1970s, the series includes a broad range of water and natural resources-related topics, including the latest research and programming on irrigation and other agricultural topics, fish and wildlife, drinking water and wastewater, watershed management, modeling, energy, climate change, economics, law and political science. Individual lectures attract an audience of 60 to 100, including graduate and undergraduate students enrolled for a one-credit-hour course. Other audience members include faculty,

Conferences, Seminars, Tours, Workshops, Other Outreach Efforts

government and organizational employees, policy makers and the general public. News releases, mailings, brochures, posters and web-based information are produced supporting this series. Most lectures are taped and posted online.

Water and Natural Resources Tour:

The tour is a long-standing NWC activity, dating back to UNL Extension's "Irrigation Tours" first conducted in the 1970s. The 2013 tour explored water and agricultural issues in Nebraska's centrally-located cropping lands that are heavily dependent on availability of groundwater. The 2014 tour looked at a variety of beneficial use, management and interstate compact issues on the North and South Platte River basins in Nebraska, Colorado and Wyoming. Attendees included state legislators, congressional staff, faculty, and water scientists and managers from a wide variety of public and private sectors. In 2014, the tour hosted about 20 members of the Nebraska State Irrigation Association's Water Leaders Academy class. The event was co-planned with the Kearney Area Chamber of Commerce, Nebraska Public Power District, Central Nebraska Public Power and Irrigation District and others.

Water Law Conference:

This one-day event focuses on Nebraska water law issues, such as water rights transfers, drainage issues and Clean Water Act enforcement. While targeted to practicing attorneys, it is also useful to water professionals and open to all. The program is developed by a committee that includes Nebraska's top water lawyers and is co-sponsored by the University of Nebraska College of Law. Continuing Legal Education credits are typically available in Nebraska, Iowa and Colorado.

Great Plains Climate, Water and Ecosystems Symposium:

This was a one-day event held in conjunction with the water law conference focusing on Great Plains climate, water and ecosystems. The symposium showcased impacts at the intersection of climate change, water and all other disciplines, including infrastructure, design, hydropower, agriculture, ecosystem services, drinking water and more.

Mentoring:

The NWC mentors new faculty members, as well as graduate and doctoral students, to help them establish successful careers. Newer faculty may attend brown bag sessions during the year to get acquainted and seek advice from senior faculty and external partners on topics, such as working with stakeholders, multidisciplinary research, and managing large data sets over their careers. In addition to helping link individual faculty members to groups, NWC faculty and staff meet with faculty individually upon their arrival and as needed afterwards. One assistantship program gives graduate students the opportunity to work on applied water resource analysis or research through the Nebraska Department of Natural Resources. The partnership supports one graduate student

for up to two years, potentially providing the intellectual content for a thesis or dissertation. Study and work can be in many areas, including hydraulic and hydrologic relationships between surface and groundwater, stream flow analysis, water supply and demand, land use data, precipitation and climate data and technical tools for economic analysis of water options.

Other Outreach:

NWC staff routinely provide talks for outside groups and respond to requests for information. Requests may include water-related presentations for public schools and special events like "Sunday with a Scientist" at the University of Nebraska State Museum of Natural History. The NWC also coordinates UNL research and extension displays at Farm Progress Company's Husker Harvest Days agriculture show near Grand Island. This is one of the largest commercial agricultural expositions in the U.S.

Educational Displays:

The NWC frequently creates public displays in association with conferences, symposiums, trade shows, educational open houses and water and environmental education festivals. Staff make presentations and participate in steering committees for annual educational and informational festivals, such as Lincoln's "Earth Wellness Festival" and others.

Electronic Resources

- **Nebraska Water Center:** http://watercenter.unl.edu
- **Water Sciences Laboratory:** http://waterscience.unl.edu
- **Facebook:** https://www.facebook.com/NebraskaWaterCenter
- **Twitter:** https://twitter.com/NebrWaterCenter
- **YouTube:** https://www.youtube.com/user/NebraskaWaterCenter

2014 Spring Water Seminar

UNL's 2014 Spring Water Seminar Series included eight public lectures covering a variety of state and regional water issues.

The free public lectures were presented roughly every-other-week from January through April in the Hardin Hall auditorium on UNL's East Campus.

Lecture topics included groundwater quality in Nebraska, owner responsibilities for private water wells, source water protection planning, variable rate irrigation as a means of improving agricultural water use efficiency, nitrates and uranium in drinking water and water resources management for multiple benefits.

"The lectures collectively form a very broad overview of water and water-related topics that are important to and of interest to Nebraskans," said Chittaranjan Ray, NWC director.

The NWC has helped sponsor, organize and present the annual lecture series for more than 40 years. UNL's School of Natural Resources co-sponsored the 2014 lecture series and offered it to students as a one-credit course.

The eight lectures of the year's series were:

1. Ground Water Quality in Nebraska, Marty Link, associate director, Nebraska Department of Environmental Quality
2. Rural Private Wells: Concerns and Well Owner Responsibilities, Steve Wilson, groundwater hydrologist, Center for Groundwater Science, Illinois State Water Survey at The Prairie Research Institute, University of Illinois at Urbana-Champaign
3. Social Capacity: Getting Producers to the Conservation Table, Linda Prokopy, associate professor of natural resources planning, Purdue University

4. A Vision for an Ultra-High Resolution Integrated Water Cycle Observation and Prediction System, Paul Houser, professor of global hydrology, George Mason University
5. A New Approach to Source Water Protection Planning: Groundwater Site Investigations, Becky Ohrtman, SWP program director, and Dan Cook, project manager, Iowa Department of Natural Resources
6. The Potential to Increase Agricultural Water Use Efficiency through Variable Rate Irrigation, Tim Shaver, nutrient management specialist, UNL West Central Research and Extension Center
7. Nitrate and Uranium in Drinking Water, Marty Stange, environmental supervisor, Hastings Utilities, and Karrie Weber, assistant professor, UNL School of Biological Sciences
8. Managing Water Resources for Multiple Benefits, Don Kraus, general manager, Central Nebraska Public Power and Irrigation District

Annual Tour Visits Colorado, Wyoming, USBR's North Platte Project

The NWC's 2014 summer water and natural resources tour left Kearney, in central Nebraska, for points of interest on the North and South Platte river basins in western Nebraska, northern Colorado and Wyoming, July 15-18.

The tour looked at the present state of limited water supplies in the North and South Platte River basins in the three states and included visits to irrigation and recreational water impoundments that are part of the U.S. Bureau of Reclamation's (USBR) historic North Platte irrigation project in Wyoming.

"The North Platte Project is central to much irrigation, power production and recreational water supplies, as well as water for threatened and endangered species for a wide swath of irrigated lands in western Nebraska," said NWC communicator and tour co-organizer Steve Ress.

"It is very remote and not easily accessed, so there tends to be a long list of people in our state water community who understand the project's importance, but who have never had a chance to see the unique system of dams and reservoirs where much of our surface water resources are generated," Ress said. The tour last traveled there in 2010.

"It is one of the most historic federal impoundment projects in the western U.S. and something anyone interested in or working with Nebraska water issues needs to see at least once to fully appreciate," Ress added.

Nebraska, Wyoming and Colorado are all dependent on irrigation water and hydropower generated in the North Platte watershed and legally must share its waters.

Construction of the North Platte Project began more than 100 years ago under President Theodore Roosevelt. Water impounded in its series of reservoirs irrigates a large area of cropland in western Nebraska, west of Lake McConaughy.

This summer's sold-out tour consisted of 60 attendees, including students enrolled in the Nebraska State Irrigation Association's "Water Leaders Academy." This was the first year the tour became part of the Water Leaders Academy curriculum. The academy is sponsored by the Nebraska State Irrigation Association.

Primary co-sponsors for the 2014 tour included: Kearney Area Chamber of Commerce; Central Nebraska Public Power and Irrigation District; Nebraska Public Power District; Nebraska Rural Radio Association; Nebraska Water Leaders Academy; Nebraska Water Balance Alliance and the Platte River Recovery Implementation Program.

"We looked closely at North and South Platte River basin issues from the standpoint of how they affect us in Nebraska from a number of different perspectives," Ress said.

Tour stops and topics included the Platte River Recovery Implementation Program environmental works near Kearney, wind tunnel pesticide research at UNL's West Central Research and Extension Center in North Platte, Lake McConaughy, Northern Colorado Water Conservancy District in Berthoud, Colorado, Colorado's famous Cameron Pass, USBR district offices in Wyoming, irrigation canals and diversion dams in western Nebraska, and Scotts Bluff National Monument.

Discussions covered water supply challenges in Colorado's urbanized "Front Range," stream flow allocations among irrigators in Nebraska and Wyoming, water for wildlife habitat, invasive species effects on rivers, irrigation efficiency measures and hydroelectric power generation.

Each year's tour is different, featuring diverse topics and locations, usually in or near Nebraska and the surrounding states.

The 2013 tour was conducted on a smaller scale, taking two days in central Nebraska to examine critical agricultural water supply and irrigation issues, along with a tour of the U.S. Department of Agriculture's Meat Animal Research Center in Clay Center.

2013 Water Science Symposium and Water Law Conference

The University of Nebraska Water Science Symposium and Water Law Conference were held Oct. 15 and 16 at Lincoln's Cornhusker Hotel.

The Oct. 15 symposium, "Changes: Climate, Water and Life," focused on current water issues in Nebraska and the Great Plains. The following day's water law conference provided practicing attorneys and water professionals with the latest information on Nebraska water policies.

The University of Nebraska College of Law and the Nebraska State Bar Association co-sponsored the events.

Organizers developed the plenary presentations and breakout sessions to provide information to assist in water planning efforts.

The day opened with a brief history of Nebraska water planning by retired UNL lecturer and consulting water resources engineer Mike Jess, followed by a presentation on the larger view on water planning by David Yates with the National Center for Atmospheric Research and Stockholm Environment Institute.

Shannon McNeeley of North Central Climate Science Center, a consortium at Colorado State University, Fort Collins, Colorado, discussed water-related climate change adaptations. McNeeley co-wrote the adaptation chapter for the 2014 National Climate Assessment Report issued by the U.S. Global Change Program and is an expert on how people respond to and make decisions related to climate change.

Michael Hayes, director of UNL's National Drought Mitigation Center, talked about incorporating drought planning into the water planning process. Alan Tomkins, director of the NU Public Policy Center, discussed research related to public trust in the Nebraska's Association of Natural Resources Districts and other water-relevant organizations in the state.

Other speakers included Karl Brooks, director of the Region VII office of the U.S. Environmental Protection Agency, Kansas City, Missouri, addressing water quality as part of comprehensive water planning.

The water law conference on Oct. 16 opened with NU College of Law professor Anthony Schutz's "Water Law 101," a primer of important statutes and cases to help attendees understand how and why they were developed.

Other speakers included John Dernbach of Widener University School of Law, Chester, Pennsylvania, on "Creating a Legal Framework for Sustainability" and Kristin Linsley Myles of Munger,

Tolles and Olson LLP, San Francisco, California, who reviewed "South Carolina v. North Carolina – an Original Jurisdiction Water Dispute from the Special Master's Perspective."

Jon Schroeder of Schroeder and Schroeder PC, Mascoutah, Illinois presented "Certified Acres: What, Why, Who, Transfers and Records."

Lash Chaffin of the Nebraska League of Municipalities spoke on municipal legal options during times of drought and Don Blankenau of Blankenau Wilmoth Jarecke LLP, Lincoln, Nebraska, gave an update on legal issues in the contentious Republican River basin.

David Bargen of Rembolt Ludtke LLP, Lincoln, talked about implications from a recent ruling in the Columbus, Nebraska, sewer back-up case.

Continuing legal education credits for Nebraska, Colorado and Iowa were offered.

NU Water Symposium Speaker Says Nebraska Could See More Hot Days

Nebraska and many parts of the Great Plains can expect more hot days and increased demands for water and energy as a result of ongoing climate change and rising temperatures, an environmental ecologist and climatologist told those attending the 2013 University of Nebraska Water Symposium.

Shannon McNeeley of the North Central Climate Science Center (NCCSC) at Colorado State University, Fort Collins, Colorado, said rising temperatures in the Great Plains will continue to stress natural resources and increase competition for water among communities, agriculture, energy production and ecological needs.

"Nebraska, under current climate change scenarios, will likely be using more water for irrigation of crops and using more energy for production of biofuels," McNeeley said.

If carbon emissions remain at current levels, she said it is likely that in coming years, the state could experience as many as 25 to 30 days more per year of temperatures over 90 degrees.

Much of the information McNeeley presented at the symposium was included in the U.S. National Climate Assessment report, released to Congress in 2014. The report is a tool for assessing how climate change may affect federal and tribal lands nationwide. McNeeley co-wrote the report's chapter on adaptation to climate change.

NCCSC is one of eight regional climate science centers contributing to the report, she said.

Along with more hot days, Nebraska could see its percentage of crop acres under irrigation increase dramatically as producers begin to feel the effects of changes in crop growth cycles due to warming winters and alterations in the timing and magnitude of rainfall events.

"These trends are already being observed, and as they continue, they will require new agriculture and livestock management practices to help mitigate their effects," McNeeley said.

She also noted that communities already vulnerable to weather and climate extremes will be "stressed even further by more frequent extreme events occurring within an already highly variable climate system."

The magnitude of these expected changes will exceed those experienced in the 20th Century, and while governmental, organizational and private sector resources are increasing efforts to deal with these predicted changes, "existing adaptation and planning efforts are inadequate to respond to projected impacts from climate change," she said.

Implementing plans to mitigate climate change effects have also been slow to come about, she said, stating that there are many political, cultural and institutional barriers to the process of making changes and that adaptation isn't "one size fits all."

Barriers to change include lack of resources to begin and sustain adaptation efforts, fragmented decision-making networks, lack of leadership and polarization of the issue politically, as well.

McNeeley is also working on a "Drought Risk and Adaptation in the Interior" study to help U.S. Department of the Interior resource managers, along with other stakeholders in the National Park Service, Bureau of Indian Affairs and Bureau of Reclamation, deal with drought in their landscapes. One of the partners in this study is the UNL's National Drought Mitigation Center.

(Source: NWC press release, Oct. 15, 2013)

Nebraska Water Sciences Laboratory

The University of Nebraska Water Sciences Laboratory (WSL) is an integral part of the NWC and the DWFI. Established in 1990, the WSL's primary purpose is to support environmental and water-related research by providing technical services and expertise in analytical and isotopic methods. Part of that focus is to train new scientists and develop cutting-edge methodologies to help remediate current and future contamination threats to our precious water resources.

The 6,000 square-foot research facility consists of six laboratories, offices, conference room, plus computer and graduate student areas. In addition to specialized environmental and stable isotope mass spectrometers, the WSL has a broad range of standard analytical and sample preparation equipment.

The WSL provides technical expertise, sophisticated analytical instrumentation, and leading research methodologies for environmental and water-related research. Specialized analyses are available for trace organics and stable isotopes, as well as more routine methods for measuring water quality.

Faculty, staff and students have analyzed thousands of samples at the facility to support water sciences research. The WSL fulfills an important teaching mission, demonstrating analysis methods to a wide range of undergraduate and graduate student researchers.

Nebraska Water Center - Faculty and Staff

Chittaranjan Ray, Ph.D., P.E., director: Directs and oversees all programming, projects and funding related to NWC operations and management. In addition, he functions as an associate director of the DWFI. Ray is a fully promoted and tenured faculty member in UNL's Department of Civil Engineering and conducts research and collaborates with faculty colleagues on proposal development and publication of papers in peer-reviewed journals.

Steven W. Ress, communications coordinator: Publicizes and promotes NWC research, extension and outreach programming and works with the communications and public relations staff of DWFI. He is a writer, editor, photographer, publisher and event coordinator, among other communications roles.

Patricia Liedle, program assistant: Plans and coordinates NWC events and grant awards programs and administration. Compiles and submits USGS and NIWR annual reports, coordinates special projects, makes arrangements for the annual Spring Water Seminar Series and annual conference, along with managing the NWC's day-to-day business and affairs.

DWFI Staff Supporting the Nebraska Water Center

Rachael R. Herpel, research and outreach coordinator: Coordinates research and outreach activities for DWFI and the Rural Futures Institute. In assisting the NWC, she is a liaison between the University of Nebraska's water faculty and the Nebraska Legislature, Natural Resources Districts and other water resources decision-makers across the state, as well as coordinating NU's Water Resources Advisory Panel.

Craig Eiting, web developer and graphic design specialist: Manages the art direction of NWC and DWFI. He administers the watercenter.unl.edu and waterforfood.nebraska.edu websites, including design, development and content uploading. He photographs events, creates promotional materials and assists with writing and publishing duties.

Jesse Starita, education/outreach associate: Engages citizens, scientists, students, producers and policymakers on local and global water and agriculture issues. Through videos, graphics, interviews and articles, he publicizes the activities of NWC/DWFI staff, faculty and students. He also represents the organization at outreach events, meetings and seminars and manages the NWC water-related research database.

Water Sciences Laboratory

Daniel D. Snow, Ph.D., Director of Services: Oversees all aspects of WSL operations and conducts research in environmental and isotopic methods development. He collaborates with faculty on proposal development, presents research at conferences and publishes papers in peer-reviewed journals. Snow also advises and mentors a growing number of undergraduate and graduate students at the WSL.

David Cassada, separations chemist and network administrator: Provides expertise and oversight for trace organic contaminant analysis using environmental mass spectrometry and is responsible for method development using gas and liquid chromatography-mass spectrometry. He provides validation of all instrumental results, performs maintenance and troubleshooting of laboratory instrumentation, computer equipment, and software, including LIMS database.

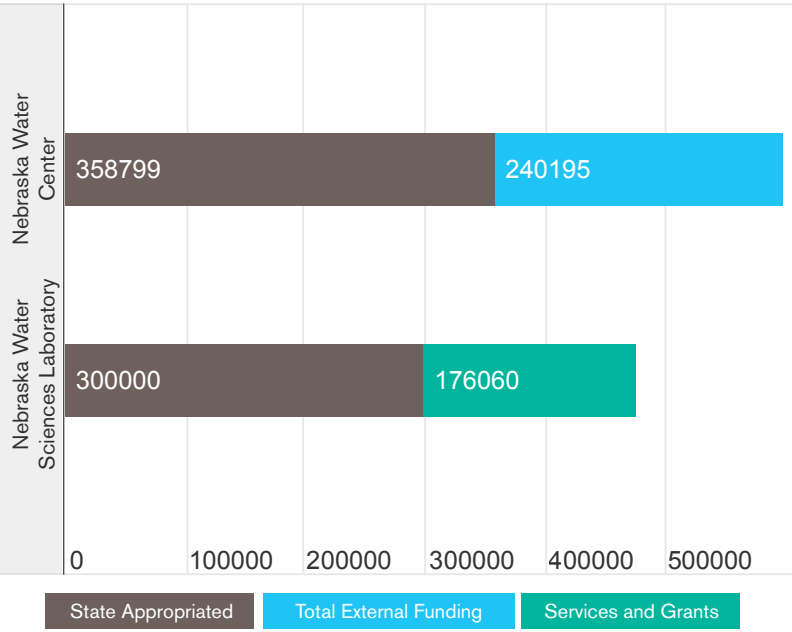
Aaron Shultis, isotope scientist: Provides expertise and oversight for high precision stable isotope analyses, leading development and application of methods for analyses of the isotopes of nitrogen, hydrogen, oxygen and carbon of samples at natural abundance levels; operates, maintains, and repairs four computer-controlled isotope ratio mass spectrometers and associated sample preparation systems.

Sathaporn (Tong) Onanong, Ph.D., research technologist II - LC/MS: Runs the WSL's triple quadrupole mass spectrometer and other trace level equipment. He performs analysis of water, soil and sediment samples for pharmaceuticals, algal toxins, munitions, antibiotics and degradation products using gas chromatography/mass spectrometry, high performance liquid chromatography, liquid chromatography/mass spectrometry and liquid chromatography/tandem mass spectrometry.

Autumn Longo, research technologist: Performs analysis of water, soil and sediment samples using inductively coupled plasma-mass spectrometry (ICP-MS), automated analyzers and other standard analytical instrumentation.She receives and logs samples, working closely with the WSL director on scheduling, preparing and analyzing samples. She trains students, interns and new technicians at the facility, and supervises all work conducted with the ICP- MS and in the wet chemistry laboratory.

Nebraska Water Center

Fiscal Year 2014 Budget:



Nebraska Water Center
Total:
$598,994
(Figures current as of May 31, 2014)

Nebraska Water Sciences Laboratory
Total:
$476,060

The graph does not include the value of the support the center receives from UNL and DWFI. These include UNL matching funds for NWC program activities, a portion of the salary of the NWC director, office rental costs, staff time devoted to NWC by DWFI staff members, and miscellaneous other administrative assistance.

Robert B. Daugherty Water for Food Institute:
waterforfood.nebraska.edu

Nebraska Water Center:
watercenter.unl.edu

Nebraska Water Sciences Laboratory:
waterscience.unl.edu

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